U.S. Coast Guard Research and Development Center
1082 Shennecossett Road, Groton, CT 06340-6096

Report No. CG-D-17-00

A METHOD FOR DEVELOPING MARINER ASSESSMENTS

FINAL REPORT
July 2000

Prepared for:

U.S. Department of Transportation
United States Coast Guard
National Maritime Center
Arlington, VA 22203-1804

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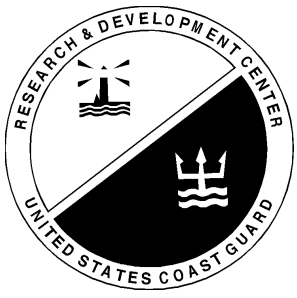

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Technical Report Documentation Page

1. Report No.	2. Government Accession Number	3. Recipient's Catalog No.
CG-D-17-00	ADA 384215	

4. Title and Subtitle	5. Report Date
A METHOD FOR DEVELOPING MARINER ASSESSMENTS	July 2000
	6. Performing Organization Code Project Number: 3302.3.2

7. Author(s)	8. Performing Organization Report No.
Marvin McCallum, Alice Forsythe, Alice Barnes, Myriam Smith, Jennifer Macaulay, George Sandberg, Joseph Murphy, and Paul Jackson	R&DC-202

9. Performing Organization Name and Address		10. Work Unit No. (TRAIS)
Battelle Seattle Research Center 4500 Sand Point Way NE Seattle, WA 98105-0395	U.S. Coast Guard Research and Development Center 1082 Shennecossett Road Groton, CT 06340-6096	11. Contract or Grant No. Contract DTCG39-94-D-E00777, Delivery Order No. 97-E-E00357/25

12. Sponsoring Organization Name and Address	13. Type of Report & Period Covered
U.S. Department of Transportation United States Coast Guard National Maritime Center (NMC) Arlington, VA 22203-1804	Final
	14. Sponsoring Agency Code Director (NMC-4B) United States Coast Guard National Maritime Center Arlington, VA 22203-1804

15. Supplementary Notes

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16. Abstract (MAXIMUM 200 WORDS)

This report presents a systematic method for developing reliable and valid performance-based assessments (PBA) of mariner proficiencies. The method is compliant with: the requirements of the International Maritime Organization's (IMO) *Seafarers' Training, Certification and Watchkeeping Code (STCW Code)*, as amended in 1995; with all relevant U.S. Coast Guard Navigation and Vessel Inspection Circulars (NVIC); with Instructional Systems Development (ISD); and with the best practices of the maritime industry. The method guides the developer through five steps: 1) specify assessment objectives, 2) determine assessment methods, 3) specify assessment conditions, 4) develop proficiency criteria, and 5) prepare the assessment materials. The report provides materials for a developer's workshop, a stand-alone assessment development manual, and four sample assessments that have been developed by project participants. Guiding materials for the actual conduct of such assessments are provided in a separate report (R&DC-204).

17. Key Words		18. Distribution Statement
Performance (human)	Skills	This document is available to the U.S. public through the National Technical Information Service, Springfield, VA 22161.
Performance tests	Trainees	
Proficiency	Training management	
Ship personnel	Transfer of training	

19. Security Class (This Report)	20. Security Class (This Page)	21. No of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	245	

Form DOT F 1700.7 (8/72) Reproduction of form and completed page is authorized.

ACKNOWLEDGMENTS

This report documents some of the recent work of an ongoing research and development project that has been conducted by the United States Coast Guard (USCG) Research and Development Center for the USCG National Maritime Center over the past several years. The authors of this report have had the opportunity and pleasure to gain an understanding of the theoretical and practical issues involved in mariner assessment while working with many knowledgeable experts. We would especially like to thank our sponsors; representatives from USCG Headquarters and Maritime Administration (MARAD); academy representatives; industry representatives; and colleagues who have supported this effort.

Mr. Perry Stutman of the USCG National Maritime Center has provided continual support and guidance in the conduct of this project. We have also received support and guidance during the course of this work from other members of the National Maritime Center, including Captain William Bennett, Mr. John Bobb, Mr. David Field, and Mr. Albert Kirchner.

Mr. Christopher Young of USCG Headquarters and Mr. Christopher Krusa of MARAD have provided critical comments, suggestions, and support at several points during this project.

Early collaboration with United States Merchant Marine Academy faculty members significantly influenced the later orientation of this effort. Participants of that early work included Captains Richard Stewart, Douglas Hard, and Robert Meurn. More recently, Ms. Emily Sporn of Massachusetts Maritime Academy and Mr. Robert Hammaker of California Maritime Academy have supported their colleagues in developing sample assessment procedures.

We have had several opportunities to present and discuss issues regarding mariner assessment with representatives from industry. Special thanks go to Mr. Charles Accardi of ARCO, Captain B. J. Acme of Seattle Maritime Academy, Captain Richard Beadon of Seaman's Church Institute, Captains Thomas Blanchard and Nils Knutstad of SeaRiver Maritime, Inc., Mr. John Crawford of Crawford Nautical School, Mr. William Eglinton of the Harry Lundberg School, Mr. Michael Godbey of Crowley Marine, Ms. Leslie Hughes of the North Pacific Fishing Vessels Owners Association, Captain Lee Kincaid of the MEBA Engineering School, Captain Roger Mercer of the Alaska Vocational Technical School, Captain Kelly Mitchell of Alaska Marine Highways, Captain Jack Newbold of I.B.U. of the Pacific, Captain Charles Pillsbury of MITAGS, Admiral David Ramsey of Marine Safety International, Mr. Albert Stiles from the Center for Advanced Maritime Officers Training, and Mr. Gregory Szczurek of Houston Marine Training Services.

Finally, we would like to thank our colleagues who reviewed this report, as well as earlier related efforts, including Ms. Susan Czarny, Ms. Mireille Raby, and Dr. Thomas Sanquist from Battelle, and Dr. Anita Rothblum, Ms. Elizabeth Weaver, Ms. Irene Gonin, and Dr. Brooke Schaab from the United States Coast Guard Research and Development Center.

EXECUTIVE SUMMARY

Introduction to the research and development project

The assessment of mariner proficiencies by practical demonstration is mandated by the International Maritime Organization (IMO) in its 1995 amendments to the *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention)* and the accompanying *Seafarer's Training, Certification and Watchkeeping Code (STCW Code)*. This requirement is a substantial departure from earlier practice, and methods for developing, conducting, and documenting such assessments must be established. The United States Coast Guard's (USCG) National Maritime Center (NMC) is sponsoring a research project through the USCG Research and Development Center (R&DC) to examine the implications of the mandate and to ensure that the best practices are available to the industry. One major objective of the project is to provide a systematic, step-by-step process for developing reliable and valid assessments and investigate its feasibility for implementation.

Project efforts reported here

The performance-based assessment (PBA) method, as described in this report, is compliant with the requirements of the STCW Code, relevant USCG Navigation and Vessel Inspection Circulars (NVICs), Instructional Systems Development (ISD), and the best practices of industry. An objective of this phase of the project was to refine the PBA method and to prepare materials to assist the industry in applying it. The approach to achieving this objective was to introduce the method to a varied sample of industry representatives through workshops and to invite some of them to participate in trial applications of the method. As a result of these efforts, the materials provided in this report have benefited from multiple reviews, multiple trial applications, and substantial comment. Materials to guide the *development* of assessment procedures that are provided here include a workshop (Chapter 2), a manual (Chapter 3), and four sample assessments (Appendices A through D). The industry representatives who participated in the project and came to understand the method were quite positive about the value of the general method in enhancing the rigor of assessment procedures. They are applying it in their own settings – sometimes with their own adaptations to their particular circumstances. Comparable guidance and materials to support the *conduct* of assessments, are provided in a separate report (R&DC–204).

Recommendations

For the most effective implementation of the project's findings and products, the following actions are recommended to the USCG and the maritime industry.

- The USCG should encourage the maritime industry in the use of the PBA method, as described in the project reports and materials. As a first step, the materials should be made widely available, on the USCG STCW website (http://www.uscg.mil/stcw) and through the National Technical Information Service (NTIS). When the industry becomes more familiar with the PBA method, it can serve as the basis for a new NVIC. The

USCG should submit the PBA supporting materials to the IMO subcommittee on Standards for Training and Watchkeeping.

- The USCG should encourage further familiarity with the PBA approach by USCG staff, as a tool for discussions of assessment with the industry and for the review of procedures submitted for approval.
- The USCG should encourage the review and use of the PBA method and materials by those groups that are dealing with the important technical issues of assessment, such as the Maritime Academy Simulator Committee (MASC), the Merchant Marine Personnel Advisory Committee (MERPAC), and academy committees appointed by the Maritime Administration (MARAD) to address STCW issues. The materials can provide a common approach and a common basis for discussion.
- Those in the industry who are responsible for training and assessment of mariner proficiency in academies, training schools, and shipping companies should make use of the PBA method and the materials presented here as a guide for their own development of assessment procedures. The materials are especially appropriate for inclusion in train-the-trainer courses.

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

ARPA	Automatic Radar Plotting Aid
CFR	Code of Federal Regulations
IMO	International Maritime Organization
ISD	Instructional Systems Development
MARAD	Maritime Administration
MASC	Maritime Academy Simulator Committee
MERPAC	Merchant Marine Personnel Advisory Committee
NMC	National Maritime Center
NTIS	National Technical Information Service
NVIC	Navigation and Vessel Inspection Circular
PBA	Performance-based assessment
R&DC	Research and Development Center
STCW Code	Seafarers' Training, Certification and Watchkeeping Code
STCW Convention	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
USCG	United States Coast Guard

A METHOD FOR DEVELOPING MARINER ASSESSMENTS

Chapter 1

OVERVIEW

This chapter provides a brief overview of a systematic method for developing reliable and valid performance-based assessments. It also describes other materials included in this report to guide the development of assessment procedures: a workshop (Chapter 2), a developer's manual (Chapter 3), and four sample assessments (Appendices A through D).

This report may be downloaded from the U.S. Coast Guard Research and Development Center web site at http://www.rdc.uscg.mil.

CHAPTER 1 - OVERVIEW

LIST OF ILLUSTRATIONS

LIST OF TABLES

INTRODUCTION

The assessment of mariner proficiencies by practical demonstration is mandated for numerous areas of competence by the International Maritime Organization (IMO) in its 1995 amendments to the *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention)* (1996A) and the accompanying *Seafarer's Training, Certification and Watchkeeping Code (STCW Code).* In response to this requirement, the United States Coast Guard (USCG) has provided guidance in the assessment of mariner skills and knowledge that calls for a *practical demonstration* of mariner proficiency (46 CFR 10.103; 46 CFR 12.01-6; USCG, 1997A; USCG 1997B; USCG 1997C). Here, *practical demonstration* refers to mariner performance of an activity that is determined to meet a specified standard of proficiency by an assessor.

This requirement for the practical demonstration of proficiency is a substantial departure from earlier assessment practice in the maritime community. In order to meet this new requirement, methods for developing, conducting, and documenting such assessments must be established. The USCG National Maritime Center (NMC) is sponsoring a research project through the USCG Research and Development Center (R&DC) to examine the implications of these requirements and to ensure that the best practices are available to the maritime industry. Past project efforts have resulted in the specification of a *performance-based assessment* (PBA) method for developing mariner assessments. This method was initially refined during a trial application to Automatic Radar Plotting Aid (ARPA) operator assessment (McCallum, Forsythe, Smith, Nunnenkamp, & Sandberg, 2000). The trial application required extensive guidance and technical support by assessment development experts. Following that application, it was concluded that broader adoption of the method by the maritime community would require further refinement of the PBA method, as well as development of aids to support application of the method. Specific aids selected for development included a workshop on assessment development, a practical guide for assessment development, and a set of sample assessment procedures.

Objectives and Approach

The general objective of the present effort is to further refine the PBA method and to develop supporting materials that will aid in the broader application and implementation of the PBA method within the maritime community. The more specific objective of this effort is to provide practical support to the assessment developers and assessors who must respond to these requirements within the United States. Three related products were identified for development:

- *A Workshop for Assessment Developers* to introduce the PBA method to individuals responsible for developing assessment procedures.
- *A Manual for Assessment Developers* to provide a reference and aid during assessment procedure development.
- A set of sample assessment procedures to serve as content and format guides for developing assessments in accordance with the PBA method.

Refinement of the PBA method and preparation of the supporting materials were complementary and concurrent activities. First, the workshop was drafted and presented to government and industry representatives of the maritime community in order to refine both the general PBA method and the workshop materials. Next, faculty members from two maritime academies developed four sample assessment procedures. During assessment development, the faculty participants provided suggestions regarding the guidance required for preparing assessment procedures, assessment procedure content, and assessment procedure format. Then, a draft of the assessment development manual was prepared and reviewed by representatives of the maritime community. Finally, based on the comments received and lessons learned, all of the PBA materials were revised to incorporate consistent methods, procedures, and language.

Report Organization

Chapter 1 of this report is intended to serve as a brief introduction, and is divided into three sections. First, a brief overview of the PBA method, as it applies to assessment procedure development, is provided. Then, the products of this project – *A Workshop for Assessment Developers, A Manual for Assessment Developers,* and the four sample assessment procedures – are briefly described. The final section of this chapter presents conclusions regarding the technical value of these products and issues concerning their implementation, as well as recommendations regarding future actions that should be taken to foster broad implementation of the PBA method.

Following this chapter are the products of this project. These products are stand-alone resources that can be used by the maritime community to aid in the implementation of the PBA method. Chapter 2 provides the *A Workshop for Assessment Developers* materials. Chapter 3 *A Manual for Assessment Developers* provides a step-by-step method for developing performance-based assessments, and contains a glossary of assessment-related terms. Appendices A, B, C, and D provide the sample assessments.

ASSESSMENT DEVELOPMENT METHOD OVERVIEW

A review of the *STCW Code*, other IMO documents, USCG guidance in Navigation and Vessel Inspection Circulars (NVICs), the methods of Instructional Systems Development (ISD), and the best practices of the maritime industry was performed. From these sources, a step-by-step *performance-based assessment* (PBA) method for developing mariner assessments was defined. In its broader form, the PBA method also addresses the *conduct* of assessments. However, the current report is limited to a consideration of assessment *development*. The conduct of assessments will be the topic of a future report.

Three basic assumptions underlie the PBA method. The first assumption is that an *expert assessor* will conduct assessments by observing a *practical demonstration* by a mariner. Generally, an *expert assessor* is a mariner qualified in the proficiencies being assessed and trained in the procedures of assessment. In the United States, an expert assessor will be qualified as a *designated examiner*, as defined in NVIC 6-97 (USCG, 1997B).

The second assumption is that the objective of conducting assessments is to obtain *valid* and *reliable* determinations of mariner proficiency. A *valid* assessment accurately determines mariners' proficiency in meeting the skill, knowledge, and performance requirements of a job. A *reliable* assessment results in consistent proficiency determinations between assessment applications.

The third basic assumption is that assessment validity and reliability require the prior development of assessment procedures, which include specification of mariner *performance measures*, *performance standards*, and *proficiency criteria*. A *performance measure* is the procedure used for observing and recording a mariner action. A *performance standard* is the level of a performance measure that must be achieved to be acceptable for assessment purposes. *Proficiency criteria* are the scoring procedures applied in determining the proficiency of a candidate on the basis of performance measures and performance standards.

Figure 1 depicts the five-step PBA method for developing assessments of mariner proficiency. The important first step, on which the method depends, is to *specify assessment objectives*. Using such sources as the *STCW Code*, established procedures, and expert opinion, the performance elements to be assessed are listed and defined. Careful analysis of objectives provides a basis to *determine assessment methods, specify assessment conditions*, and *develop proficiency criteria*. Finally, with the analytical work completed, the assessment developer can *prepare assessment materials*. The assessment materials are a relatively self-contained set of procedures and instructions that can be circulated for expert review and, ultimately, provided to the assessor who will conduct the assessment. This approach is compatible with that described in IMO circular 853 (IMO, 1998).

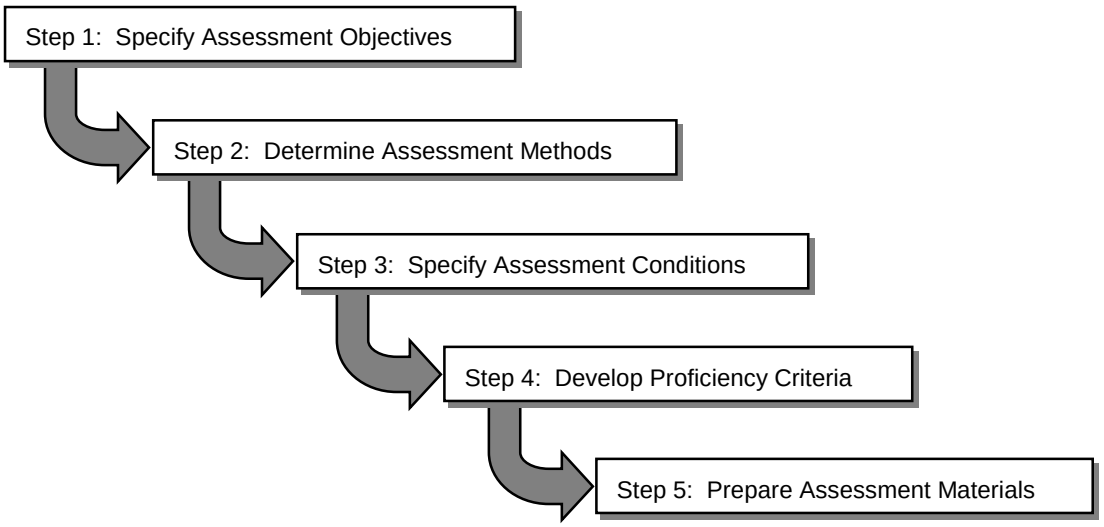

Figure 1. Five-step method for developing mariner performance-based assessments.

The background and basis for the PBA method, as it applies to assessment development, is described in greater detail in a more lengthy technical report (McCallum, Forsythe, Smith, Nunnenkamp, & Sandberg, 2000). An extension of the method to evaluating the capability of simulators to support mariner assessment is documented in a separate technical report (Raby, Forsythe, McCallum, & Smith, 2000). Guidance in the practical application of the PBA method is discussed in the next section, which introduces *A Workshop for Assessment Developers* (Chapter 2), *A Manual for Assessment Developers* (Chapter 3), and the sample assessment procedures (Appendices A, B, C, and D).

Early in the research project, it became apparent that *developing* and *conducting* assessments were separate functions, likely to be performed by different individuals with different backgrounds and sometimes even by different organizations. The efforts described in this report focused on developing assessments. These materials were prepared with the assumption that the resulting assessment materials would be provided to an assessor who would prepare for and conduct the actual assessment.

More recent project efforts focus on providing guidance and practical aids to the assessor. Currently, training officers from a major commercial shipping company are adapting the assessment procedures presented in this report to their own operations and equipment. These training officers will assist ship officers in assessing candidate proficiency onboard their vessels. One implementation issue of immediate concern to them has been the appropriate level of detail in the specification of assessment objectives, measures, and standards. Another issue concerns the consistency between the company's established operating procedures and the performance

standards required by the assessments. Findings relevant to these and other implementation issues will be provided in a future report (McCallum, Barnes, Forsythe, and Smith, 2000), along with guidance and practical aids for conducting assessments.

PRACTICAL AIDS FOR DEVELOPING MARINER ASSESSMENTS

This section of the report introduces the three products resulting from this phase of the project, which have been prepared to aid the maritime community in the practical application of the PBA method. Each product is briefly described, along with a discussion of the process of its development, any pertinent findings during development of the product, and issues concerning implementation or further refinement of the product.

A Workshop for Developing Mariner Assessments

Following initial definition of the PBA method, it was recognized that a training workshop could serve as a useful means of introducing this method to people in the maritime community who would be responsible for some aspect of mariner assessment. A workshop was drafted and presented to individuals from the government and private sectors of the maritime industry in two sessions in March and April of 1998. *A Workshop for Assessment Developers* was initially developed as a three-day introduction to developing and conducting assessments. However, it was later recognized that the two functions of developing and conducting assessments could best be addressed in separate workshops focusing on the assessment developer and assessor roles. This report provides the workshop that focuses on assessment development (See Chapter 2). A separate report (R&DC–204) provides guidance and practical aids for the conduct of assessments.

In its current format, the workshop consists of eight modules. Each module consists of lecture slides, and five of the modules have practical exercises, as summarized in Table 1. The workshop is estimated to require approximately two days. Chapter 2 provides the course curriculum outline, the set of slides used to support the lectures and exercises, and the exercise materials.

Table 1. Summary of workshop module lecture slides and practical exercises.

Workshop Module	Lecture Slides	Practical Exercise
1	Introduction to Assessment Development Process	None
2	Validity and Reliability	1. Understanding Validity and Reliability
3	Step 1: Specify Assessment Objectives	2. Specifying Assessment Objectives
4	Step 2: Determine Assessment Methods	3. Determining Assessment Methods
5	Step 3: Specify Assessment Conditions	4. Specifying Assessment Conditions
6	Step 4: Develop Performance Criteria	5. Developing Performance Measures
		6. Developing Performance Standards
7	Step 5: Prepare Assessment Materials	None
8	Summary/Overview	None

Participants in the 1998 sessions generally viewed the workshop as a useful means of introducing a systematic method for developing mariner assessments. They also identified a number of issues that they thought would affect the successful implementation of the workshop. First, it was seen as important that the full range of those involved in assessment development within the maritime community have an opportunity to participate, including government personnel who regulate mariner assessment, faculty members of maritime academies and schools, and shipping company training staff. A second critical issue concerned the qualifications of the workshop leaders, who should have a broad understanding of instructional system development, general knowledge of mariner assessment policy, and familiarity with mariner proficiency requirements. Finally, many workshop participants viewed the practical exercises as central to the learning experience. They stressed the importance of allowing adequate time to complete each exercise and to have the workshop leader conduct a critical review of the exercise results.

A Manual on Developing Mariner Assessments

The initial set of workshop materials included a set of job aids that were intended to help assessment developers in applying the PBA method. Early reviewers of these job aids noted their strong preference for an integrated manual that could be used as a reference and aid throughout the assessment development process. In response, *A Manual for Assessment Developers* was prepared (See Chapter 3). Early drafts of this manual were reviewed by several participants in the current project and refined in response to their comments. The current version of the manual is intended for anyone in the maritime industry who is responsible for the development of assessments that will rely upon practical demonstration and comply with IMO *STCW Code* requirements.

The manual provides a step-by-step method for assessment development. It is organized around the five PBA assessment development steps (see Figure 1), with each step further divided into additional sub-steps. Detailed instructions for completing each sub-step are provided. The manual also includes several decision aids and heuristics for assessment developers. Throughout the manual, an extended example is provided, based upon the *lookout duties* sample assessment, showing how to apply the steps of the assessment development process. In addition, the complete sample assessment for lookout duties is provided as an attachment to the manual. A copy of the manual is provided as Chapter 3, *A Manual for Assessment Developers.*

Reviewers consistently acknowledged the technical and practical value of the manual as a reference and aid in assessment development. Many reviewers also expressed concern about the complexity of the assessment development process. This concern typically has focused more on issues concerning the level of effort required to develop the large set of assessment procedures specified by the *STCW Code*, rather than the technical complexity of the process itself. That is, all reviewers have noted that, after investing some time in studying the manual, they understand the process for developing assessment procedures and are comfortable applying it. However, these individuals also recognize that a significant level of effort will be required to develop such procedures for the range of proficiencies identified in the *STCW Code*.

In addition, reviewers frequently expressed concern about the consistency of terminology among IMO doctrine, USCG NVICs, the ISD literature, and the manual. IMO terminology has been

used as much as possible. One result of this approach has involved the use of the term "assessor," which is used in IMO documents, rather than the term "designated examiner," which is the term used in the USCG NVIC 6-97 (USCG, 1997B).

Sample Assessment Procedures

A key activity in the present PBA research effort involved the development of a set of sample assessment procedures. Faculty members from Massachusetts Maritime Academy prepared two assessments for navigation watch proficiencies – *Performance of Lookout Duties* and *Performance of Helmsman Duties*. Faculty members from California Maritime Academy prepared two assessments for engineering watch proficiencies – *Preparing the Main Engine for Operation* and *Locating Common Faults and Preventing Damage to Generators*.

The academy participants prepared the sample assessments using the draft workshop materials with only limited review and guidance from the project's assessment development experts. As part of the assessment development process, the participating faculty members conducted trial applications of draft assessment procedures with academy cadets playing the role of candidates. As a result of their work in developing the sample assessments, the faculty participants provided critical comments regarding the technical adequacy of the PBA method, specific areas where more complete guidance was required, and potential standards for assessment procedure content and format.

During the course of developing the four assessment samples, several standard approaches toward assessment procedure content and format evolved. Specific areas where standard approaches were developed included assessment control sheets and worksheets, examiner instructions, candidate instructions, and assessment documentation. These standard approaches are reflected in both *A Manual for Assessment Developers* and the sample assessments procedures. Appendices A through D provide the four sample assessments.

In developing the assessments, a number of issues were raised that have yet to be fully reconciled. First, there is the issue regarding the appropriate level of detail of performance objectives, measures, and standards. The current set of samples has a consistent level of detail, in which all specific actions required of a candidate are defined. An alternative approach would be to provide more general guidance with less detailed definitions of performance measures and standards. In this case, existing operating procedures would be assumed to provide the basis for defining measures and standards. The present authors are concerned that a less detailed approach would be likely to reduce assessment validity and reliability. Typically, existing operating procedures do not provide adequately comprehensive and accurate performance steps and standards to support valid and reliable assessment. However, a reduced level of detail is viewed by some as necessary in order to deal with the large number of assessments that must be developed. Further information regarding this issue will be obtained during the trial application of the sample assessments currently underway at the participating commercial shipping company.

A second issue concerns subject matter expert review of assessment procedures. In an industry with a high degree of individualism, it is not surprising that one of the areas where assessment developers confronted difficulties was in obtaining consensus agreement among other operational experts regarding the suitability of the developed procedures. In developing the

sample assessments, the participating faculty had difficulty in convening a group of experts and reaching consensus on the proficiency measures, standards, and scoring procedures. This issue, as well as those identified earlier in this section, is reviewed and discussed in the following section of this report.

CONCLUSIONS AND RECOMMENDATIONS

The major objectives of this phase of the project were to refine the PBA method and to prepare materials to assist the industry in applying it. The approach to achieving these objectives involved introducing the method to a varied sample of industry representatives through the workshops and inviting some of them to participate in trial applications of the method. This approach provided the opportunity to refine both the general method and the materials. The materials provided here – workshop, manual, and sample assessment procedures – have benefited from multiple reviews, multiple trial applications, and substantial comment.

Conclusions

The PBA method, as described in this report, is compliant with the requirements of the *STCW Code*, USCG NVICs, ISD, and the best available industry practices. The industry representatives who participated in the project and came to understand the method were quite positive about the value of the general method in enhancing the rigor of assessment procedures. They are currently applying it in their own situations – sometimes with their own adaptations. If the PBA method is to be applied more broadly in the industry, these materials must be more widely available.

As the trial assessments were developed and circulated for review, several difficult technical issues were identified that have not been resolved. One issue is uncertainty about the level of detail appropriate in the development of an assessment procedure. How much detail is necessary in describing the assessment objectives and criteria to assure reliability and validity? How much should be left to the judgment of the assessor? There is certainly no one answer to the question of how much detail is needed. Major considerations will include the particular proficiency in question and the circumstances under which the assessment will be conducted. The trial applications being conducted with the commercial shipping company will provide some insight into this issue in at least one real context. Participants from the shipping company will provide suggestions based on their experience with the assessments regarding the level of detail appropriate in the assessment materials and the level of detail required in assessment instructions, measures, standards, and scoring procedures.

A second issue is the difficulty in convening expert panels and obtaining consensus about the appropriate assessment objectives, measures, and standards. Some of the difficulty in holding and conducting such meetings stemmed from a lack of familiarity with the PBA method among those who were asked to serve as experts. It is expected that broader implementation of the PBA method would mitigate much of this problem. However, there is also a related issue of experts representing different organizations and operational settings. Different operational settings are often associated with legitimate differences in the performance requirements of mariners. In these cases, the differences must be either reconciled through changes in operations, or recognized and reflected in different assessment objectives, measures, and standards.

An additional issue concerns the level of effort required to prepare a full set of assessments that will be responsive to the full range of proficiencies identified in the *STCW Code*. It must be recognized that the broad sets of proficiencies defined in the *STCW Code* resulted from an extensive effort. Providing the detailed assessment procedures for all proficiencies is a much

more extensive effort. However, several factors could help reduce the overall level of effort and provide adequate time for the systematic development and implementation of procedures. First, many of the operating procedures and standards upon which these assessments will be based already exist. Shipping companies and individual vessels typically have standard operating policies and procedures for their crews, which can serve as the starting point in developing assessments. Second, in many cases, assessment procedures can be developed and shared within and between organizations. Schools and academies could share assessment procedures, as could similar ships. Differences in operating requirements that dictate differences in the assessment objectives, measures, and standards, will typically represent variations across similar assessments and much of the content and format of assessments could still be shared.

Early in the project's examination of PBA, it became apparent that *developing* and *conducting* assessments were separate functions, likely to be performed by separate individuals and even separate organizations. Further project efforts will examine the issues of conducting mariner assessments, including planning for the actual conduct of a procedure, the degree of detail appropriate for the assessment forms, and the amount of familiarization or training needed by the assessor. A separate report provides materials for use in conducting assessments.

Recommendations

For the most effective implementation of the project's findings and products, the following USCG and industry actions are recommended.

- The USCG should encourage the maritime industry in the use of the PBA method, as described in the project reports and materials. As a first step, the materials in this report should be made widely available, on the USCG STCW website (http://www.uscg.mil/stcw) and through the National Technical Information Service (NTIS). When the industry becomes more familiar with the PBA method, it can serve as the basis for a new NVIC. In addition, the USCG should submit the PBA supporting materials to the IMO subcommittee on Standards for Training and Watchkeeping.
- The USCG should encourage further familiarity with the PBA approach by USCG staff, as a tool for discussions of assessment with the industry and for the review of procedures submitted for approval.
- The USCG should encourage the review and use of the PBA method and materials by those groups who are dealing with the important technical issues of assessment, such as the Maritime Academy Simulator Committee (MASC), the Merchant Marine Personnel Advisory Committee (MERPAC), and academy committees appointed by the Maritime Administration (MARAD) to address STCW issues. The materials can provide a common approach and a common basis for discussion.
- Those in the industry who are responsible for training and assessment of mariner proficiency in academies, training schools, and shipping companies should make use of the PBA method and the materials presented here as a guide for their own development of assessment procedures. The materials are especially appropriate for inclusion in train-the-trainer courses.

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